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08/902.331	07/29/97	GRUENENFELDER	P 622/42052DIV

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EXAMINER
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ART UNIT
1753

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Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.
08/902,331

Applicant(s)
Gruenenfelder et al.

Examiner
Gregg Cantelmo

Group Art Unit
1753



☒ Responsive to communication(s) filed on Mar 1, 1999

☒ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claims

☒ Claim(s) 35-37 and 44 is/are pending in the application.

Of the above, claim(s) _____ is/are withdrawn from consideration.

☐ Claim(s) _____ is/are allowed.

☒ Claim(s) 35-37 and 44 is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☒ The proposed drawing correction, filed on Mar 1, 1999 is ☐ approved ☒ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been
☐ received.

☐ received in Application No. (Series Code/Serial Number) _____

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☐ Notice of References Cited, PTO-892

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

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DETAILED ACTION

Response to Amendment

1. In response to the amendment filed on March 1, 1999:
 - a. The specification objection presented in the office action mailed August 27, 1998 is withdrawn;
 - b. Claims 34 and 38-43 are canceled;
 - c. The 112 first paragraph rejection of claim 37 stands in light of the amendment;
 - d. The 112 second paragraph rejections of claims 36 and 37 stands in light of the amendments failure to address these rejections;
 - e. The 102(b) rejection of claims 35-36 presented in the office action mailed August 27, 1998 stands;
 - f. The provisional double patenting rejection of claims 34-43 are withdrawn in light of the terminal disclaimer.

Terminal Disclaimer

2. The terminal disclaimer filed on March 1, 1999 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of U.S. patent No. 5,688,381 has been reviewed and is accepted. The terminal disclaimer has been recorded.

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Drawings

3. The proposed drawing correction and/or the proposed substitute sheets of drawings, filed on March 1, 1999 have been disapproved because they introduce new matter into the drawings. 37 CFR 1.121(a)(6) states that no amendment may introduce new matter into the disclosure of an application. The original disclosure does not support the showing of Sketch A supplied with the amendment.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claim 37 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

As originally presented in the previous office action, Claim 37 teaches of a relationship between the circular target body radius and the thickness of the periphery of the target body (d_a). Use of the equation " $d_a \approx 0.5 r_1$ " in line 3, further defines the relationship. The specification fails to teach of a thickness of the periphery of the target body nor of a quantified relationship between the thickness of the target periphery and the radius of the circular target body. One skilled in the

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art at the time the invention was made would be required to perform undue experimentation to prepare a target within the given parameters. Applicant's apparent basis for support is not found within the specification and the amendment fails to disclose where such critical limitations, as taught by the amendment, are disclosed within the specification.

6. Claim 44 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

In light of newly submitted claim 44, this claim teaches of a relationship between the degree of taper and radius by manipulating numerous equations. The relationship defined as $0.2 r_1 \leq d_0 \leq 0.54 r_1$. However there is no support for such a critical limitation. Applicant relies on support and disclosure provided in the amendment and not disclosed within the original application. Since this claimed limitation is a critical feature of the instant invention, the disclosure as recited in the original application is not enabling for the claimed relationship. The examiner has interpreted such a limitation such that by teaching of the same target dimensions, the target will inherently generate the same taper at some point during sputter operation. Furthermore, it would not have been clear to one having ordinary skill in the art to employ a target having an amount of taper defined by the relationship: $0.2 r_1 \leq d_0 \leq 0.54 r_1$ since the original specification fails to provide any teaching toward deriving such a critical feature.

In addition this claim provides additional new subject matter whereby the cross sectional plane along said axis is defined by "steadily bent lines." Such a limitation is not clearly disclosed

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by the original specification. It is required the original specification clearly support any and all critical limitations of the instant claims. The amendment failed to clearly point out where the in the disclosure, such limitations are supported. The examiner, being unable to find such support in the original specification, has interpreted such a limitation such that any smooth target surface will have steadily bent lines.

Claim Rejections - 35 USC § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

11. Claims 35-37 and 44 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. patent No. 4,385,979 (Pierce et al.).

Pierce et al. teach of a target that demonstrates the specified target parameters in claims 35-37 and 44. Pierce et al. Teach of a circular target body 212 (Fig. 3a) comprising a cylinder-body with a central opening, with the backside of said body being formed of a flat annular outer ring-surface and an inwardly recessed flat circular center surface. In its broadest reasonable interpretation, the target of Fig. 3a is "substantially bell-shaped." It is the examiner's position that during the sputtering process the body of the target will, as it is sputtered, become concavely tapered toward the axis of the target and thereby define a substantially bell-shaped

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target defined by steadily bent lines. Such erosion being similar to that which is disclosed in Fig. 2b. Pierce, teaching of a target radius and geometry within the ranges of the instant claims will inherently generate an amount of taper that at least partially overlaps the range of instant claim 44.

In column 11, lines 11-13, the prior art teaches of a target having an outside diameter of 131.0 mm and of a maximum height of 22.4 mm. Using the instant applications claimed mathematical relationship in claim 34, line 11: " $0.22 r_1 \leq d_0 \leq 0.38 r_1$ " and the diameter of 131.0 mm ($r_1 = 65.5$ mm) d_0 from the prior art, the distance range from the outermost periphery of the target to the bottom of the target can be derived. According to these limitations, the target distance can range from a minimum height or thickness of 14.41 mm to a maximum height or thickness of 24.89 mm. Therefore this relationship is well known to one of ordinary skill in the art since the maximum height assigned to the specified radius of the prior art was 22.4 mm. With respect to the amended range of newly submitted claim 44, since this range is clearly broader than that which was recited in previous claim 34 (now canceled at Applicants request) it is the examiner's position that the radius of Pierce et al. (as discussed above) is still within the radius range of the instant claims and therefore will, inherently generate an amount of taper within the teachings of the instant application during sputtering.

Also the target diameter cited in the prior art in column 11, lines 11-12 (131.0 mm) is within the range specified in claims 35 and 36 of the instant. With respect to claim 37, and the mathematical relationship " $d_a \approx 0.5 r_1$," one skilled in the art would employ such a relationship as

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stated above to obtain an optimal thickness. Pierce et al. cite in column 11, line 13 that the maximum height for the target for a diameter of 131.0 mm (65.5 mm radius) is 22.4 mm. Use of the instant applications mathematical relationship and of the prior arts target diameter obtains a target thickness or height of 37.75 mm. When compared to the maximum height proposed in the prior art, the proposed value is less than what is calculated from the mathematical relationship. However, in order to obtain this ideal thickness as the prior art indicates, it is necessary to experiment with thicknesses both substantially larger and smaller than this maximum value. Furthermore, the mathematical relationship states that the thickness of the target is approximately one-half of the radius of the target and does not provide adequate disclosure of a range that would be acceptable for this approximate equivalence. One of ordinary skill in the art would apply the teaching of Pierce et al. to the instant applications claimed invention to provide a maximum sputter yield onto the substrate.

Response to Arguments

7. Applicant's arguments filed March 1, 1999 have been fully considered but they are not persuasive. In particular:

Applicant argues that Pierce is silent about the importance of taper of a sputtering surface. Pierce discloses in **all of the figures** of a taper to the target surface and therefore is clearly not silent of the importance of a tapered target surface. Furthermore, it is the examiner's position that during sputtering of the target of Pierce, the degree of taper in the target will at some moment

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have a smooth bell-shaped configuration as disclosed by the instant application. The claims given their broadest reasonable interpretation never clearly disclose when the bell shaped configuration is present and thus need only be present at some point during the use of said target. In addition target configurations such as those shown in Figs. 3a and 5 are "substantially bell-shaped." The gap defining the area between the target shows an up-side down cymbal configuration, which is clearly a bell-shaped object. Target configuration such as that in Figs. 3a, 3c, and 5 will upon sputtering erode moreso in the central region 213 than the edge regions. As this target erodes it will at some point be a bell shaped sputtering surface define by steadily bent lines. During sputter operation the target will erode such that any sharp edges or points will degrade into smooth surfaces and therefore have a steadily bent target surface.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

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CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregg Cantelmo whose telephone number is (703) 305-0635. The examiner can normally be reached on Monday through Thursday from 8:30 a.m. to 5:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen, can be reached on (703) 308-3322. The fax phone number for the organization where this application or proceeding is assigned is (703) 305-7718.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



NAM NGUYEN
PRIMARY EXAMINER
GROUP 1100

gc



April 7, 1999